CHAPTER 1

Introduction

Welcome to the Hydrologic Engineering Center Next Generation Flood Damage Analysis (NexGen HEC-FDA) computer program. This program allows you to perform plan formulation and evaluation for flood damage reduction studies. It includes risk-based analysis methods that follow Federal and Corps of Engineers policy regulations (ER 1105-2-100 and ER 1105-2-101).

Both economic flood damage and hydrologic engineering analyses are performed using a consistent study configuration (streams, damage reaches, plans, and analysis years). Two types of evaluations are available: analysis of damage and project performance by analysis years; and equivalent annual damage. Many output tables and plots are used for reporting results. Computations and display of results are consistent with technical procedures described in EM 1110-2-1619.

This chapter discusses the purpose of HEC-FDA, gives a brief overview of the program requirements, capabilities, and of this user's manual.

Contents

Purpose

The HEC-FDA program provides the capability to perform an integrated hydrologic engineering and economic analysis during the formulation and evaluation of flood damage reduction plans. The program follows functional elements of a study involving coordinated study layout and configuration, hydrologic engineering analyses, economic analyses, and plan formulation and evaluation. You use it continuously throughout the planning process as the study evolves from the base year without-project condition analysis through the analyses of alternative plans over their project life. Hydrologic engineering and economics (flood inundation damage analyses) are performed separately, in a coordinated manner after specifying the study configuration and layout, and merged for the formulation and evaluation of the potential flood damage reduction plans.

Program Capabilities

HEC-FDA is an integrated system of software, designed for interactive use in a multi-tasking, multi-user environment. The program consists of a graphical user interface (GUI), hydrologic engineering and economics components, database and management capabilities, graphics and reporting facilities.

Computation Procedures

The Corps of Engineers requires the use of risk-based analysis procedures for formulating and evaluating flood damage reduction measures (ER 1105-2-101). They quantify uncertainty in discharge-exceedance probability, stage-discharge, and damage-stage functions and incorporate it into economic and engineering performance analyses of alternatives. The process applies Monte Carlo simulation, a numerical-analysis procedure that computes the expected value of damage while explicitly accounting for the uncertainty in the basic parameters used to determine flood inundation damage. HEC has developed the HEC-FDA computer program to assist in analyzing flood damage reduction plans using these procedures. Please see Appendices E and F and EM 1110-2-1619 for descriptions of the analysis process used by HEC-FDA.

NexGen HEC-FDA performs all the computations available in the old FDA batch program plus risk-based analysis and other enhancements. Inventories of floodplain structures are used to calculate damage-stage-uncertainty information at damage reach index locations. Expected and/or equivalent annual damage are computed in the evaluation portion of the program.

Database

HEC-FDA uses a relational database to store data and output for reports. The xBase format was chosen for the program because it is: 1) an adopted industry standard; 2) compatible with the file structure found in commercial software; and 3) functional in the multiple platform environment. The database is the central part of HEC-FDA. The database operations require use of internal identifiers to relate the program's data sets. This presents special design considerations to avoid potential database corruption from affects of multiple users. Review of the sections on study backups and multiple users in Chapter 3 is strongly suggested.

User Interface

You interact with HEC-FDA through a graphical user interface (GUI). The interface is designed to make the program easy and efficient to use. The interface provides the following functions:

- File management
- Data entry and editing
- Data selection and assignments
- Hydrologic and economic analyses
- Tabular and graphical displays of input and output data
- Reporting facilities
- On-line help

Data Entry

You can enter data in a variety of ways using HEC-FDA. The most common is using text fields on the program's screens. This is also called the "form" method. Certain windows have an alternative data entry called "tables." The same data entered on the form can instead be entered into a spreadsheet-like table. Some windows have import capabilities. For example, water surface profiles may be imported from a HEC-RAS (USACE 1997) or HEC-2 (USACE 1991) file and the structure inventory can be imported from HEC-SID (USACE 1989) and ASCII text files.

Analysis Results

A number of analysis results are available for review of computations and evaluation of results. Flood risk performance, damage by analysis years, and equivalent annual damage are included in the results. Output includes tables and selected graphics of information by plan, analysis year, stream, and damage reach for the entire plan. Plan comparisons may also be performed.

User's Manual Layout

This user's manual is the primary documentation on how to use the HEC-FDA program. The manual is organized as follows:

- Chapters 1 - 3 provide an introduction and overview of HEC-FDA, as well as instructions on how to install the software.

- Chapters 4 - 7 describe how to use HEC-FDA in a step-by-step procedure, including illustrative examples from a sample study.

- Chapter 8 provides information on trouble shooting when problems arise.

- Several Appendices are included for assistance. Appendices A and B provide references and a glossary, respectively. Appendix C describes procedures for importing water surface profiles. Appendix D describes the levee wave overtopping analysis procedures. Appendix E provides an overview of the economic flood damage procedures and Appendix F describes the Monte Carlo Simulation Methodology used for computing expected and equivalent annual damage.

CHAPTER 2

Installation Instructions for HEC-FDA Package

This chapter discusses the hardware and system requirements needed to use HEC-FDA and how to install and execute the program.

Contents

Important

The SETUP program must be used to load the program, which decompresses and installs the files to the appropriate directories. The program cannot be simply copied from the distribution disks to a hard drive and then executed.

HEC-FDA Program Disks and Files

The HEC-FDA (Version 1.0, October 1997) Package is supplied on four (4) high-density 3½" program disks and contains the program, associated system files, and test data sets from the HEC Prospect Training Class - “Risk-based Analysis for Flood Damage Reduction Studies” (BEARTRNG, BEARWS2, BEARWS3, BEARWS4, WRK2_PRO, & WRK2_ANS).

Hardware and Software Requirements

Before installing the HEC-FDA package, make sure the computer system meets the following hardware and software requirements.

- 16 megabytes (Mb) of available Random Access Memory (RAM)
- One 3½" floppy diskette drive (1.2Mb)
- 40 Mb (or greater) available hard disk space
- Windows NT 3.51 or 4.0 or Windows 95 operating system.
- An IBM PC compatible computer based on an 80386DX, 80386SX, 80486DX or Pentium (80586) processors..
- HEC-FDA also requires that an appropriate math coprocessor be installed, except on the 80486DX systems.

Make Backup Copies of the Program Disks

A backup copy of the program disks should be made, and the original program disks stored in a safe place. Your protection of the original disks are your best way to assure a working version.

Installation Procedures

To install the HEC-FDA package, do the following:

Windows 95 or Windows NT 4.0

1. Insert diskette #1 in the A drive.

2. Press Start.

3. Press Run.

4. Type **a:\setup**, press the OK button.

5. Follow setup instructions.

Windows NT 3.51

1. Insert diskette #1 in the A drive.

2. From the File menu of the Program Manager, click on Run

3. Type **a:\setup**, press the OK button.

4. Follow the setup instructions.

Execution of the HEC-FDA Package

The execution of the HEC-FDA package is accomplished by double clicking on the icon HEC-FDA in the folder HEC.

Program Problems

If errors are encountered, please contact HEC.

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